
Solanum coalitum (Solanaceae), a New Endemic Species from Southern Ecuador

Sandra Knapp

Department of Botany, The Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom. sk@nhm.ac.uk

ABSTRACT. A new endemic species of *Solanum* L. sect. *Holophylla* (G. Don) Walpers s.l. is described from Ecuador: *Solanum coalitum* S. Knapp is only known from the páramo of Cerro Toledo in Parque Nacional Podocarpus in the province of Loja. *Solanum coalitum* had been confused with the more widespread *S. stenophyllum* Dunal; its differences from that species are detailed and its species group membership and potential relationships within section *Holophylla* are discussed. The species is illustrated and given a preliminary conservation assessment of Endangered.

RESUMEN. Se describe una especie nueva de *Solanum* L. sección *Holophylla* (G. Don) Walpers s.l. endémica del Ecuador: *Solanum coalitum* S. Knapp se conoce únicamente del páramo del Cerro Toledo en el Parque Nacional Podocarpus en la provincia de Loja. *Solanum coalitum* ha sido confundida con *S. stenophyllum* Dunal, una especie de distribución más amplia; se detalla sus diferencias con esa especie y se discute el grupo de especies al que pertenece y las relaciones potenciales dentro de la sección *Holophylla*. Se ilustra la especie y se le atribuye un estado de conservación preliminar de En Peligro.

Key words: Biodiversity, Ecuador, endemic, IUCN Red List, *Solanum*.

Solanum L., with ca. 1500 species, is the largest genus in the Solanaceae and one of the 10 most species-rich genera of flowering plants (Frodin, 2004). The highest species diversity in the genus occurs in South America and is concentrated in the Andes (Knapp, 2002). As part of the collaborative project “PBI Solanum: A world-wide treatment” (see Knapp et al., 2004; <<http://www.nhm.ac.uk/solanaceaesource>>), descriptions of all species of *Solanum* are being provided online. This intensity of work in the genus by a large number of collaborators, coupled with the massive increase in specimens available from the Andean regions of South America, has meant that many new taxa are being discovered (Knapp, 2005; Granados-Tochay & Orozco, 2006; Nee et al., 2006; Granados-Tochay et al., 2007). In addition, the intensive global monographic project, in conjunction with the commu-

nity commitment to achieving Targets 1 (a global plant species checklist) and 2 (preliminary conservation assessments for all known plant species) of the *Global Strategy for Plant Conservation* (GSPC; Secretariat of the CBD, 2002), means that recognition and description of endemic taxa or those facing a significant conservation threat is particularly timely. The description of taxa from protected areas is important to help conservation efforts in these habitats; knowledge of endemic species helps to strengthen the political case for government investment in protected areas management in the species-rich tropics.

The *Solanum nitidum* Ruiz & Pavón species group of section *Holophylla* (G. Don) Walpers s.l. was monographed almost 20 years ago (Knapp, 1989). As part of a re-examination of the boundaries and composition of section *Holophylla* s.l., this new species from the high elevations of southern Ecuador was revealed. Unfortunately, its identity was not confirmed until after the Red List for Ecuadorian endemics went to press (Knapp et al., 2007), but it boosts the number of endemic *Solanum* species in Ecuador from 26 to 27.

Solanum coalitum S. Knapp, sp. nov. TYPE: Ecuador. Loja: Yangana–Valladolid, km 1.1, track to Sierra Toledo, Km 18.5, 3250 m, ca. 4°23'S, 79°06'W, 14 Nov. 1997, G. Lewis & B. Klitgaard 3719 (holotype, LOJA; isotypes, AAU, BM, K, QCA, QCNE). Figures 1, 2.

Haecc species *Solano stenophyllo* Dunal similis, sed suffrutibus nanis vel serpentibus, caulibus et foliis plerumque glabris sed interdum superficie adaxiali foliorum ad margines revolutos et caulibus juvenilibus trichomatibus albis laxe ramosis vestitis, floribus maioribus, differt.

Subshrubs to 1 m, sometimes lax and trailing; stems glabrous and shining, usually appearing warty from the prominent leaf scars; young stems completely glabrous or sometimes with a few scattered loose branched trichomes to 0.5 mm, white; bark of older stems dark brown, shining; sympodial units plurifoliate, monopodial. Leaves simple, 2.5–10.4 × 0.7–3.5 cm, narrowly elliptic to less commonly elliptic,



Figure 1. Isotype specimen of *Solanum coalitum* S. Knapp (Lewis & Klitgaard 3719, BM).

the upper surface glabrous and shiny, sometimes with scattered branched white trichomes at the edge where the margin is revolute, the lower surface glabrous or sparsely papillate, the papillae drying reddish brown, perhaps glandular, the base acute to attenuate, the

margins strongly revolute, pubescent adaxially where turned under, the apex acute; primary veins 5 to 10 pairs, drying darker than the lamina; petiole 0.3–1.6 cm, glabrous and shiny. Inflorescences terminal, 2.5–6(–10) cm, branched 4–6 times, with 3 to 15(to

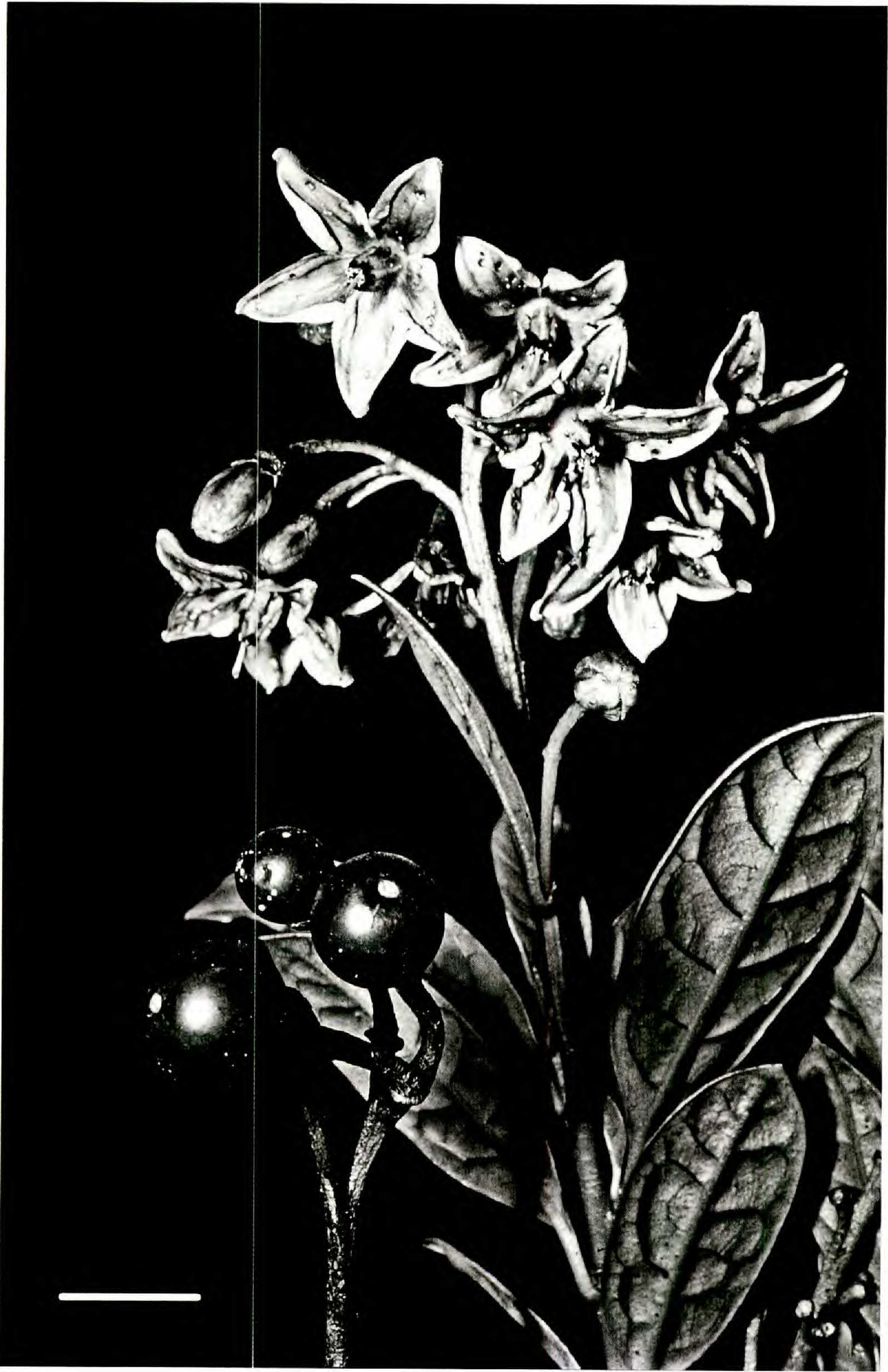


Figure 2. Shoot of *Solanum coalitum* S. Knapp with flowers and fruit (Lewis & Klitgaard 3719, Cerro Toledo, Loja, Ecuador). Scale bar = 1 cm. Photograph reproduced with permission of G. Lewis.

20) flowers, glabrous and shining, or with scattered loosely branched trichomes along the axes, the peduncle 2–4(–5.5) cm; pedicels in flower 0.8–1.3 cm, stout, ca. 1 mm diam. at the base, ca. 2 mm diam. at the apex, nodding, glabrous, minutely papillate or sparsely pubescent with loosely branched white trichomes ca. 0.3 mm; pedicel scars widely spaced, inserted in a short sleeve ca. 1 mm long; buds globose when very young, soon elliptic and strongly exerted from the calyx tube. Flowers all perfect; calyx with the tube 2.5–4 mm, cup-shaped, strongly

constricted at base, thick and coriaceous, glabrous or with a few branched trichomes like those of the inflorescence axis, the lobes 1–1.5 mm, broadly deltate or minute, glabrous, with margins glabrous or densely pubescent with branched trichomes ca. 0.3 mm; corolla 2–2.6 cm diam., violet to dark mauve-purple, lobed 3/4 to base, stellate, the lobes 0.9–1.3 × 0.5–0.8 cm, slightly campanulate or planar at anthesis, densely pubescent with simple or dendritic trichomes ca. 0.5 mm long on margins and tips, sometimes with scattered simple trichomes on

adaxial lobe surface, these denser on the petal midvein, the abaxial surface glabrous; anthers 5–6 × 1.5–2 mm, the free portion of the filaments 1–1.5 mm, the filament tube less than 0.5 mm, glabrous; ovary conical, glabrous; style 1–1.2 cm, straight, glabrous; stigma clavate or 2-lobed, bright green (fide Lewis & Klitgaard 3719), the surface minutely papillate. Fruit a globose berry, 1.2–1.5 cm diam., shiny and black when mature, the pericarp thin; fruiting pedicels 2–2.2 cm, 2–2.5 mm diam. at the base, 2–3 mm diam. at the apex, erect, thick and woody; seeds 4–5 × 3–4 mm, flattened reniform, reddish brown, margins not enlarged, surfaces minutely pitted, testal cells sinuate in outline. Chromosome number: not known.

Distribution. *Solanum coalitum* is endemic to Ecuador, known only from the páramo of Cerro Toledo south of Loja along the road leading to the Peruvian border, on ridges between the towns of Yangana and Valladolid, at 3150–3460 m in the southwestern corner of Parque Nacional Podocarpus.

Phenology. *Solanum coalitum* has most often been collected in flower between October and December, during the dry season. All specimens are in flower, but the type is the only collection with mature fruits. It is likely that fruiting material will be found in January or February.

Etymology. *Solanum coalitum* is named in honor of two botanical couples, Gwilym Lewis (K) and Bente Klitgaard (BM), who collected the type specimen, and Peter Jørgensen and Carmen Ulloa (both MO), who collected one of the paratypes. They are sterling examples of strong and companionable botanical partnerships (from “coalitus,” Latin for communion or fellowship).

Solanum coalitum is a striking species with its large, fleshy, bright purple flowers and black fruits (see Fig. 2). It is a member of the *S. nitidum* species group (sensu Knapp, 1989), sharing with the other species in that group plurifoliate sympodial units, monochasial growth, large purple or violet flowers, and pedicels inserted into a distinct “sleeve” (see fig. 2 in Knapp, 1989). Genus-wide phylogenetic studies using a variety of molecular markers (Bohs, 2005; Weese & Bohs, 2007) have shown that the species of this group are part of a monophyletic group containing taxa related to *S. dulcamara* L. (bittersweet) and a wide variety of other species with worldwide distribution (the Dulcamaroid clade of Bohs, 2005). The recognition of *S. pubigerum* Dunal (Mexico to Costa Rica) and *S. aligerum* Schlechtendal (Mexico to Argentina) as sister taxa of the *S. nitidum* species group (Knapp, 1989) has been supported by molecular data (Bohs,

2005). *Solanum valdiviense* Dunal (coastal southern Chile) is also a member of this larger group. Together these species can be defined as section *Holophylla* s.l. Ecuador is home to three endemic species of the *S. nitidum* species group (*S. leiophyllum* Benthams, *S. imbaburensis* S. Knapp, and *S. coalitum*).

Some specimens of *Solanum coalitum* have been identified as *S. stenophyllum* Dunal, with which it is very similar. *Solanum coalitum* differs from *S. stenophyllum* in its subshrub, sometimes trailing habit, its glabrous stems and leaves (except, occasionally, for the occurrence of white trichomes on the stems and a peculiar marginal white trichome band on the leaves), its cyathiform (rather than conical) calyx, and its slightly larger flowers that are glabrous abaxially. Trichomes of *S. coalitum* when they occur are looser and more openly dendritic than the almost echinoid trichomes of *S. stenophyllum* that are distinctly yellow or yellow-tinged when dry. The fruiting pedicels of *S. stenophyllum* appear to be nodding when fruit are mature, while those of *S. coalitum* are erect. Specimens of *S. stenophyllum* have been collected from the province of Loja (i.e., Jørgensen et al. 477, 1068, BM) from further north and at slightly lower (2600–3000 m) elevations in drier and/or degraded forests. *Solanum stenophyllum* grows as a shrub or small treelet, usually in disturbed situations. Some individuals of *S. stenophyllum* in southern Ecuador are very sparsely pubescent, but the conical calyx and yellowish, closely branched trichomes serve to distinguish these plants.

Solanum coalitum would key out with *S. leiophyllum*, *S. macbridei* Hunziker & Lallana (southern Peru and Bolivia), and *S. imbaburensis* in the key in Knapp (1989), being distinguished from *S. imbaburensis* by its broadly deltate, rather than long-triangular calyx lobes, and its leaves with sparsely papillate undersides.

Habitat. The sole locality in which *Solanum coalitum* has been encountered is the páramo of Cerro Toledo in the extreme southwestern corner of Parque Nacional Podocarpus, one of the largest protected areas in Ecuador. Cerro Toledo is a mixed páramo of tussock grasses and shrubby vegetation on the divide of the Cordillera de Sabanillas; the area is a pathway used by local people to take cattle from one drainage to another, and as such has a medium level of disturbance (Hofstede et al., 2002). Roads constructed by the military to allow access to radio towers have opened the area to others. Hofstede et al. (2002) suggested that the inhospitable nature of the climate in the region (wet, cold, and windy) will limit human incursion on a large scale. Cerro Toledo is isolated from other páramo regions of southern Ecuador, and represents one of the southernmost extensions of the páramo habitat in the Andes (Luteyn, 1999).

IUCN Red List category. The fact that *Solanum coalitum* occurs only within the boundaries of the Parque Nacional Podocarpus is good news for its ultimate protection and conservation, but its very restricted distribution in an isolated habitat means it certainly is of some conservation concern. Using the IUCN criteria (IUCN, 2001), I assess this species as having a preliminary conservation status of Endangered (EN) due to its restricted distribution of less than 100 km² in a fragmented and isolated habitat. Population-level data may reveal that the species is, in fact, Critically Endangered (CR), but this is currently not assessable from the available herbarium specimens.

Paratypes. ECUADOR. **Loja:** carr. Yangana–Toledo, *Jaramillo 10606* (AAU); road from Yangana to Cerro Toledo, Km 18–22 to the antennas, *Jørgensen, Ulloa & Caranqui 2188* (BM, MO, NY, QCA); Yangana–Cerro Toledo, páramo of Cerro Toledo, *Jørgensen & Madsen 65686* (AAU, BM, LOJA, QCA); Parque Nac. Podocarpus, Cerro Toledo, *Madsen, Bloch & Christensen 75611* (AAU, BM); Parque Nac. Podocarpus, Cerro Toledo, *Madsen, Bergman & Pedersen 86100* (AAU, MO), *Madsen 86333* (AAU, BM, QCNE); Parque Nac. Podocarpus, Cerro Toledo, E of Yangana, *Øllgaard, Laegaard, Thomsen, Korning & Illum 58068* (AAU, MO); Parque Nac. Podocarpus, Cerro Toledo, wet páramo around radio station, *Øllgaard, Laegaard, Thomsen, Korning & Illum 58162* (AAU, BM, MO); Parque Nac. Podocarpus, páramo del cerro Toledo, *Palacios 12863* (MO).

Acknowledgments. I thank the National Science Foundation for funding this work through the Planetary Biodiversity Inventory program, award DEB-01316614 “PBI *Solanum*: A worldwide treatment”; Michael Nee, Lynn Bohs, David Neill, Carmen Ulloa, and Peter Jørgensen for searching for herbarium specimens or contributing insights about *Solanum* taxonomy; the curators of herbaria cited in the text for loan of herbarium specimens; the Photographic Unit of the Natural History Museum for preparing the photographic figures; and Gwilym Lewis for permission to use his beautiful photographs of this striking species. Carmen Ulloa Ulloa and Don Ugent provided useful comments on the original manuscript.

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